Mon 1/9/17 MAPS Inner Barrel Master-010917 ID WBS Task Name Institutio Fixed Cost | calculate fixed | Cost | Activity | Number1 | Resource Cost | cost+contingency Start Finish Duration Mon 10/3/16 \$0.00 \$2,678,210.00 \$7,170,534.00 1.1 MAPS Inner Barrel Starts Sat 10/1/16 Sat 10/1/16 \$0.00 \$0.00 \$0.00 1.2 MADS Inner Ramel Enrice 0 days Tue 6/1/21 Tue 6/1/21 so oo so oo \$0.00 \$0.00 \$0.00 #FRROR 1.3 Milestones & Key Tasks 0 days Mon 10/3/16 Mon 10/3/16 \$0.00 \$0.00 \$0.00 1.3.1 ALICE ITS Key Tasks Mon 1/2/17 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 0 days Mon 1/2/17 6 1.3.1.1 \$0.00 \$0.00 \$0.00 \$0.00 ALICE MAPS Production 240 days Mon 11/28/16 Mon 11/6/17 \$0.00 7 1.3.1.2 ALICE ITS IB FPC Production 135 days Thu 2/23/17 Fri 9/1/17 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 240 days \$0.00 9 1.3.1.4 ALICE ITS IB Stave Assembly Fri 6/16/17 Mon 7/9/18 \$0.00 \$0.00 \$0.00 ITS constri0 \$0.00 \$0.00 266 days 10 1.3.1.5 ALICE ITS Electronics Pre-Production Mon 3/13/17 Tue 8/1/17 \$0.00 \$0.00 \$0.00 ITS Electro \$0.00 \$0.00 ITS Electronics Pre-Production 11 1.3.1.6 ALICE ITS Electronics Production \$0.00 \$0.00 \$0.00 ITS Electro \$0.00 \$0.00 240 days Wed 8/2/17 Tue 7/17/18 ITS Electronics Productio 12 1.3.2 1181 days Tue 11/1/16 Tue 6/1/21 \$0.00 \$0.00 \$0.00 \$0.00 13 1.3.2.1 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 sPHENIX Technical conceptual Design preproposal 0 days Tue 11/1/16 Tue 11/1/16 14 1.3.2.2 sPHENIX Technical Design prototype start 0 days Wed 11/1/17 \$0.00 \$0.00 \$0.00 Wed 11/1/17 \$0.00 15 1.3.2.3 sPHENIX Technical Design initial procurement 0 days \$0.00 \$0.00 sPHENIX Start Construction 16 1324 0 days Wed 8/1/18 Wed 8/1/18 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 17 1325 eDHENIY Installed and Ready for Ream 0 days Tue 6/1/21 Tue 6/1/21 so on so on \$0.00 ready for b0 \$0.00 \$0.00 \$0.00 18 1.3.3 LDRD Milestones & Critical Tasks 781 days Mon 10/3/16 Fri 10/18/19 \$0.00 \$0.00 \$0.00 #FRROR 24 1.4 LANL LDRD \$3,732,648,00 LANL R&E0 767 days Mon 10/3/16 Mon 9/30/19 \$0.00 \$365,500.00 \$2,471,148,00 #ERROF LANL R&D 105 1.5 sPHENIX Project 1217 days \$0.00 \$2.312.710.00 \$3.437.886.00 Mon 10/3/16 Mon 6/21/21 \$1,111,656,00 \$4,320,886,50 106 1.5.1 sPHENIX Project Management 1217 days Mon 10/3/16 \$0.00 \$0.00 \$126,568,00 sPHENIX (0 Mon 6/21/21 LANI \$126,568,00 \$139,224,80 107 1.5.1.1 \$0.00 \$0.00 \$0.00 Project Manager 1217 days Mon 10/3/16 Mon 6/21/21 \$0.00 \$0.00 Mechanical Integration Engineer 108 1.5.1.2 1217 days Mon 10/3/16 Mon 6/21/2 \$0.00 \$0.00 \$63,284.00 \$63,284.00 \$69,612.40 109 1.5.1.3 \$0.00 \$0.00 \$63,284.00 Electronics Integration Engineer 1217 days \$63,284.00 \$69,612.4 110 1.5.20 319 days \$0.00 \$25,000.00 \$82,664.00 \$57,664.00 \$105,893.2 111 1.5.20.1 Final Electronics Design 40 days Fri 6/1/18 Thu 7/26/18 LANI \$0.00 \$25.000.00 \$46,264.00 \$21.264.00 \$60,393.20 112 | .5.20.1.1 Produce RDU first unit 4 wks Fri 6/1/18 Thu 6/28/18 \$10,000,00 \$10,000,00 \$11 552 00 \$1,552.00 \$14,440.00 113 .5.20.1.3 Teet RDII 2 wks Fri 6/29/18 Thu 7/12/18 so on so on sa nan nn \$9.080.00 \$11 350 0 Elec tech[50%, Electronics Engineer[50%] 114 .5.20.1.6 Produce CRU first unit 4 wks Fri 6/1/18 Thu 6/28/18 \$15,000,00 \$15,000,00 \$16 552 00 \$1.552.00 \$22 345 20 Elec tech[10%] 115 .5.20.1.2 Elec tech[50%], Electrical Engineer[50%] Test CRU 2 wks Fri 6/29/18 Thu 7/12/18 \$0.00 \$0.00 \$9.080.00 \$9.080.00 \$12,258.0 116 .5.20.1.4 117 1.5.20.3 \$0.00 \$0.00 \$36,400.00 \$36,400.00 \$45,500.00 Thu 4/20/17 118 .5.20.3.1 3 wks \$0.00 \$0.00 \$15,600.00 \$15,600.00 \$19,500.00 119 .5.20.3.2 Thu 5/11/17 \$0.00 \$0.00 \$20.800.00 \$20,800.00 \$26,000.0 120 1.5.19 252 days Wed 11/1/17 Tue 10/30/18 \$0.00 \$100.000.00 \$341,976,00 \$228,456.00 \$400.352.00 121 1.5.19.2 \$0.00 \$50.000.00 185 days Wed 11/1/17 Fri 7/27/18 LAN \$159,736,00 \$109,736.00 \$197,070,00 122 5 10 2 1 Paviaw AI ICE design 2 u/re Wart 11/1/17 Wed 11/15/17 so on so on \$10,400,00 \$10,400.00 \$10,400.00 123 .5.19.2.2 \$20,800,00 4 wks Thu 11/16/17 Fri 12/15/17 \$0.00 \$0.00 \$20,800,00 \$26,000,00 modify design if necessary 124 | .5.19.2.3 Develop MAPS inner tracker mechanicaal model 2 mons Mon 12/18/17 \$0.00 \$0.00 \$0.00 125 | .5.19.2.4 \$0.00 \$50,000.00 \$128,536.00 \$78,536.00 \$160,670.00 126 19.2.4.45 30 days 127 19.2.4.46 60 days Mon 4/2/18 Eri 6/22/18 esn non on esn non on \$77.936.00 \$27.936.00 \$97.420.00 128 19.2.4.47 10 days Mon 6/25/18 Fri 7/6/18 so oo so oo \$7,760.00 \$7.760.00 \$9,700.0 Mech Tech Physicist(20% 129 19.2.4.48 final design 15 days Mon 7/9/18 Fri 7/27/18 \$0.00 \$0.00 \$15,600.00 \$15,600.00 \$19,500.0 130 1.5.19.1 Mechanics Integration 67 days Mon 7/30/18 Tue 10/30/18 MIT \$0.00 \$50,000.00 \$118,800.00 \$68,800.00 \$147,330.00 131 5.19.1.48 Cooling System \$0.00 \$20.000.00 \$23,360.00 \$54,200.00 25 days 132 9.1.48.22 Design (modify ALICE) 10 days Wed 8/1/18 Tue 8/14/18 \$0.00 \$0.00 \$10,400.00 \$10,400.00 \$13,000.00 133 9.1.48.23 \$20,000.00 \$20,000.00 \$34,700.00 10 days \$7,760.00 134 9.1.48.24 \$0.00 \$0.00 \$6,500.00 \$5,200.00 135 5.19.1.49 Safety Systems 40 days Wed 9/5/18 Tue 10/30/12 \$0.00 \$10.000.00 \$30 800 00 \$20 800 00 \$37 980 00 136 9.1.49.31 so on so on raviaw cancore & interlocke 10 days Wed 9/5/18 Tue 0/18/18 \$5,200,00 \$5 200 00 \$5.080.00 137 9.1.49.33 \$10,000,00 \$10,000,00 cooling interlocks design 30 days Wed 9/19/18 Tue 10/30/18 \$25,600,00 \$15,600,00 \$32,000,00 138 5.19.1.50 Stave Assembly Tooling 45 days Mon 7/30/18 Fri 9/28/18 \$0.00 \$20.000.00 \$44,640.00 \$24,640.00 \$55,150.00 139 9.1.50.31 \$0.00 \$0.00 design 10 days Mon 7/30/18 Fri 8/10/18 \$10,400.00 \$10,400.00 \$13,000.0 140 9.1.50.32 30 days Mon 8/13/18 Fri 9/21/18 141 9.1.50.33 Fri 9/28/18 \$0.00 \$0.00 \$2,600.00 \$2,600.00 \$2,600.00 5 days 142 1.5.19.5 Mechanics Final Design Review 13 days Mon 10/1/18 Wed 10/17/18 \$0.00 \$0.00 \$21.840.00 \$8,320,00 \$9,152.0 143 .5.19.5.6 2 days Mon 10/1/18 Tue 10/2/18 so on so on \$2,080,00 \$2.080.00 \$2,288.0 144 5 19 5 3 Incorporate Review Comments 10 days Wed 10/3/18 Tue 10/16/18 \$0.00 \$0.00 \$5 200 00 \$5 200 00 \$5,720,00 145 .5.19.5.4 Complete Final Mechanical Design \$0.00 \$0.00 \$1,040.00 1 day Wed 10/17/18 Wed 10/17/18 \$1,040.00 \$1,144.00 146 1.5.19.6 40 days Mon 12/18/17 \$0.00 \$0.00 \$41,600,00 \$41,600.00 \$46,800.00 147 | .5.19.6.1 Metrology design 20 days Mon 12/18/17 Fri 1/19/18 LAN \$0.00 \$0.00 \$20.800.00 \$20,800.00 \$26,000.00 148 | .5.19.6.2 Design jigs 20 days Mon 1/22/18 \$0.00 \$0.00 \$20,800.00 \$20,800.0 149 1.5.4 MAPS Inner Barrel Review 12 days Thu 10/18/18 Fri 11/2/18 \$0.00 \$0.00 \$14,560.00 \$14,560.00 \$16,016.00 150 1.5.4.1 MAPS Final Design Review 1 day Thu 10/18/18 Thu 10/18/18 \$0.00 \$0.00 \$2,080.00 \$2 080 00 \$2,288.00 151 1542 10 days Fri 10/19/18 Thu 11/1/18 so oo so oo \$10,400,00 \$10,400.00 \$11,440.00 Electronics Engineer[50%],Mechanical Engineer[50%],Physicis 152 1.5.4.3 1 day Complete Final Design Fri 11/2/18 Fri 11/2/18 \$0.00 \$0.00 \$2 080 00 \$2 080 00 \$2 288 00 153 1.5.5 \$0.00 \$50,000.00 \$129,550.00 Final System Test 90 days Mon 10/1/18 Fri 2/1/19 \$103,640.00 Productio 0 \$53,640.00 154 1.5.5.1 Full Pre-Production-Mechnical System Mock Up Test \$129,550.00 90 days Mon 10/1/18 Fri 2/1/19 \$50,000.00 \$50,000.00 \$103,640.00 \$53,640.00 nical Engineer[20%],Mech Tech[50%],Physicist[50%] 155 1.5.22 \$0.00 \$2,137,710.00 \$2,518,078.00 \$3,228,802.50 568 days Wed 8/1/18 Fri 10/2/20 LANI \$380,368.00 156 .5.22.145 \$1,534,750.50 180 days Fri 11/2/18 \$0.00 \$1,002,670.00 \$1,144,212.40 157 22.145.34 Produce 68 Inner Staves 180 days Fri 11/2/18 Fri 7/12/19 \$445,670.00 \$445,670.00 \$585,350.00 \$790,222.50

Mon 1/9/17 MAPS_Inner_Barrel_Master-010917

Mon 1/9/17										MAPS_	Inner_E	Barrel_Master-0	10917											
ID WBS Task		Duration	Start		tic Fixed Cost calculate fixed cost	1 .	Number	r1 Resource Cost cost+c		Qtr 4	Qtr 1	2017 1 Qtr 2	Qtr 3 Qtr 4	Qtr 1	2018 Qtr 2 Qtr	3 Qtr 4	Qtr 1 Q	2019 r 2	Qtr 4	Qtr 1	2020 Qtr 2 Qtr 3	Otr 4	2021 Otr 1 Otr 2	Qtr 3 Qtr 4
158 22.145.35	Stave Production Full Cost Recovery of CERN Manpo	180 days	Mon 11/5/18	Fri 7/12/19	\$500,000.00 \$500,000.00	\$500,000.00	0	\$0.00	\$675,000.00								-		•					
159 22.145.36	Other ITS/CERN Test Equiptment Items	120 days	Mon 11/5/18	Fri 4/19/19	\$30,000.00 \$30,000.00	\$31,862.40	0	\$1,862.40	\$39,828.00								*	Physicist	t[5%],Mech Tech	[2%]				
160 22.145.37	Travel and Per Diem at CERN	180 days	Mon 11/5/18	Fri 7/12/19	\$27,000.00 \$27,000.00	\$27,000.00	0	\$0.00	\$29,700.00								1		-					
161 .5.22.146	Non-CERN Procurements	168 days	Wed 8/1/18	Fri 3/22/19	\$0.00 \$1,135,040.00	\$1,167,321.60	0	\$32,281.60	\$1,459,152.00							•	++	— •						
162 22.146.15	Procure 68 Readout /RDO Units	100 days	Mon 11/5/18	Fri 3/22/19	\$265,740.00 \$265,740.00	\$281,260.00	0	\$15,520.00	\$351,575.00								*	Physicist[10]	K],Elec tech[20%;	1		\neg		'
163 22.146.16	Procure Optical Links 68	60 days	Tue 11/6/18	Mon 1/28/19	\$81,600.00 \$81,600.00	\$82,531.20	0	\$931.20	\$103,164.00								-	Physic st[2%],Elec te	ch[2%]			\dashv		'
164 22.146.17	Procure 34 Common Readout Units	100 days	Fri 8/3/18	Thu 12/20/18	\$181,700.00 \$181,700.00	\$183,252.00	0	\$1,552.00	\$229,065.00							>	Physi	ist[2%],Elec tech[2%)			_		'
165 22.146.18	sPHENIX CRU Production Contingency	100 days	Fri 8/3/18	Thu 12/20/18	\$90,000.00 \$90,000.00	\$90,000.00	0	\$0.00	\$112,500.00							>-	-							'
166 22.146.19	Procure 100 SamTec Cables	60 days	Mon 8/6/18	Fri 10/26/18	\$27,000.00 \$27,000.00	\$27,931.20	0	\$931.20	\$34,914.00							*	Physicist[2%]	Elec tech[2%]						
167 22.146.20	Procure Ancillary Materials (LVPS and cables etc)	100 days	Tue 8/7/18	Mon 12/24/18	\$100,000.00 \$100,000.00	\$101,552.00	0	\$1,552.00	\$126,940.00							4	Phys	cist[2%],Mech Tech[2	2%)					
168 22.146.21	Procure Cooling Plant	100 days	Wed 8/1/18	Tue 12/18/18	\$40,000.00 \$40,000.00	\$41,552.00	0	\$1,552.00	\$51,940.00							ر *	Physic	ist[2%],Mech Tech[25	%]					
169 22.146.22	Procure Assembly Fixtures & Jigs	60 days	Thu 8/2/18	Wed 10/24/18	\$100,000.00 \$100,000.00	\$100,931.20	0	\$931.20	\$126,164.00							-	Physicist[2%],	Mech Tech[2%]			ו			'
170 22.146.23	Procure End Wheels	100 days	Fri 8/3/18	Thu 12/20/18	\$34,000.00 \$34,000.00	\$35,552.00	0	\$1,552.00	\$44,440.00							>	Physi	ist[2%],Mech Tech[2	%]		1			'
171 22.146.24	Procure Cylindrical Structural Shells	100 days	Mon 8/6/18	Fri 12/21/18	\$11,000.00 \$11,000.00	\$12,552.00	0	\$1,552.00	\$15,690.00							}	Physi	cist[2%],Mech Tech[2	!%]		1			'
172 22.146.25	Procure Detector Half Barrels	100 days	Tue 8/7/18	Mon 12/24/18	\$13,000.00 \$13,000.00	\$14,552.00	0	\$1,552.00	\$18,190.00							 	Phys	cist(2%),Mech Tech(2	2%)		1			'
173 22.146.26	Procure Service Half Barrels	100 days	Wed 8/8/18	Tue 12/25/18	\$120,000.00 \$120,000.00	\$121,552.00	0	\$1,552.00	\$151,940.00)	Phys	eist[1%],Mech Tech[1	2%]		1			'
174 22.146.27	Procure Detector and Service Half Barrels	100 days	Thu 8/9/18	Wed 12/26/18	\$21,000.00 \$21,000.00	\$22,552.00	0	\$1,552.00	\$28,190.00								Phys	icist[#%],Mech Tech[#	2%)		1			'
175 22.146.28	Procure Two Half Support Structures	100 days	Fri 8/10/18	Thu 12/27/18	\$50,000.00 \$50,000.00	\$51,552.00	0	\$1,552.00	\$64,440.00							₩-	Phys	icist[2%],Mech Tech[2%]		-			'
176 1.5.22.3	Assembly and Testing	468 days	Wed 12/19/18	Fri 10/2/20	\$0.00 \$0.00	\$206,544.00	0	\$206,544.00	\$234,900.00								—	_					→	'
177 .5.22.3.1	Test Production FEMS, e-Links, CRU, LV, optical link	60 days	Mon 3/25/19	Fri 6/14/19 LANL	\$0.00 \$0.00	\$13,968.00	0	\$13,968.00	\$17,460.00									₩	Elec tech[30%],P	hysicist[200%]				'
178 .5.22.3.2	Assemble & Test Cooling System	20 days	Wed 12/19/18	Tue 1/15/19 MIT	\$0.00 \$0.00	\$7,760.00	0	\$7,760.00	\$9,700.00								- M	ech Tech,Physicist[50	0%]					'
179 .5.22.3.3	Stave Reciept Inspection	10 days	Mon 7/15/19	Fri 7/26/19 LBNL	\$0.00 \$0.00	\$3,880.00	0	\$3,880.00	\$4,850.00										Physicist[5	50%],Elec tech[5	50%]			'
180 .5.22.3.4	Individual Stave Readout Test	70 days	Mon 7/29/19	Fri 11/1/19 LBNL	\$0.00 \$0.00	\$10,864.00	0	\$10,864.00	\$13,580.00										*	Physicist[3	00%],Elec tech[20%	•]		'
181 .5.22.3.5	Metrology on Stave Assemblies	70 days	Mon 11/4/19	Fri 2/7/20 LBNL	\$0.00 \$0.00	\$41,720.00	0	\$41,720.00	\$52,150.00											*	Mechanical Eng	ginee (20%), Mech	h Tech[50%]	
182 .5.22.3.6	Assemble full Ladders into Half support	100 days	Mon 2/10/20	Fri 6/26/20 LBNL	\$0.00 \$0.00	\$24,832.00	0	\$24,832.00	\$31,040.00												¥	Mech Tech	[200%],Physicist[200%]	
183 .5.22.3.7	Metrology on Final Assembly	10 days	Mon 6/29/20	Fri 7/10/20 LBNL	\$0.00 \$0.00	\$10,400.00	0	\$10,400.00	\$13,000.00													Mechani	cal Engineer	
184 .5.22.3.8	Half detector Assembly Readout and Cooling Test	60 days	Mon 7/13/20	Fri 10/2/20	\$0.00 \$0.00	\$93,120.00	0	\$93,120.00	\$93,120.00													V	Physicist[200%],Mech Tech,	Elec tech
185 1.5.6	Installation	131 days	Mon 10/5/20	Mon 4/5/21	\$0.00 \$0.00	\$250,400.00	0	\$250,400.00	\$301,048.00														-	
186 1.5.6.1	Installation Prep	10 days	Mon 10/5/20	Fri 10/16/20	\$0.00 \$0.00	\$15,520.00	0	\$15,520.00	\$19,400.00														Mech Tech,Physicist,Elec	ech
187 1.5.6.2	Installation Review	1 day	Mon 10/19/20	Mon 10/19/20	\$0.00 \$0.00	\$2,080.00	0	\$2,080.00	\$2,288.00														Physicist, Mechanical Eng	neer,Electrical Engineer
188 1.5.6.3	Installation	60 days	Tue 10/20/20	Mon 1/11/21	\$0.00 \$0.00	\$186,240.00	0	\$186,240.00	\$232,800.00														Physicist[201	0%],Mech Tech[200%],Ele
189 1.5.6.4	Commissioning	60 days	Tue 1/12/21	Mon 4/5/21	\$0.00 \$0.00	\$46,560.00	0	\$46,560.00	\$46,560.00														*	Physicist[200%],Mech Te
190 1.5.7	Ready for beam	0 days	Mon 4/5/21	Mon 4/5/21	\$0.00 \$0.00	\$0.00	0	\$0.00	\$0.00														 	4/5
										1	-						-						-	